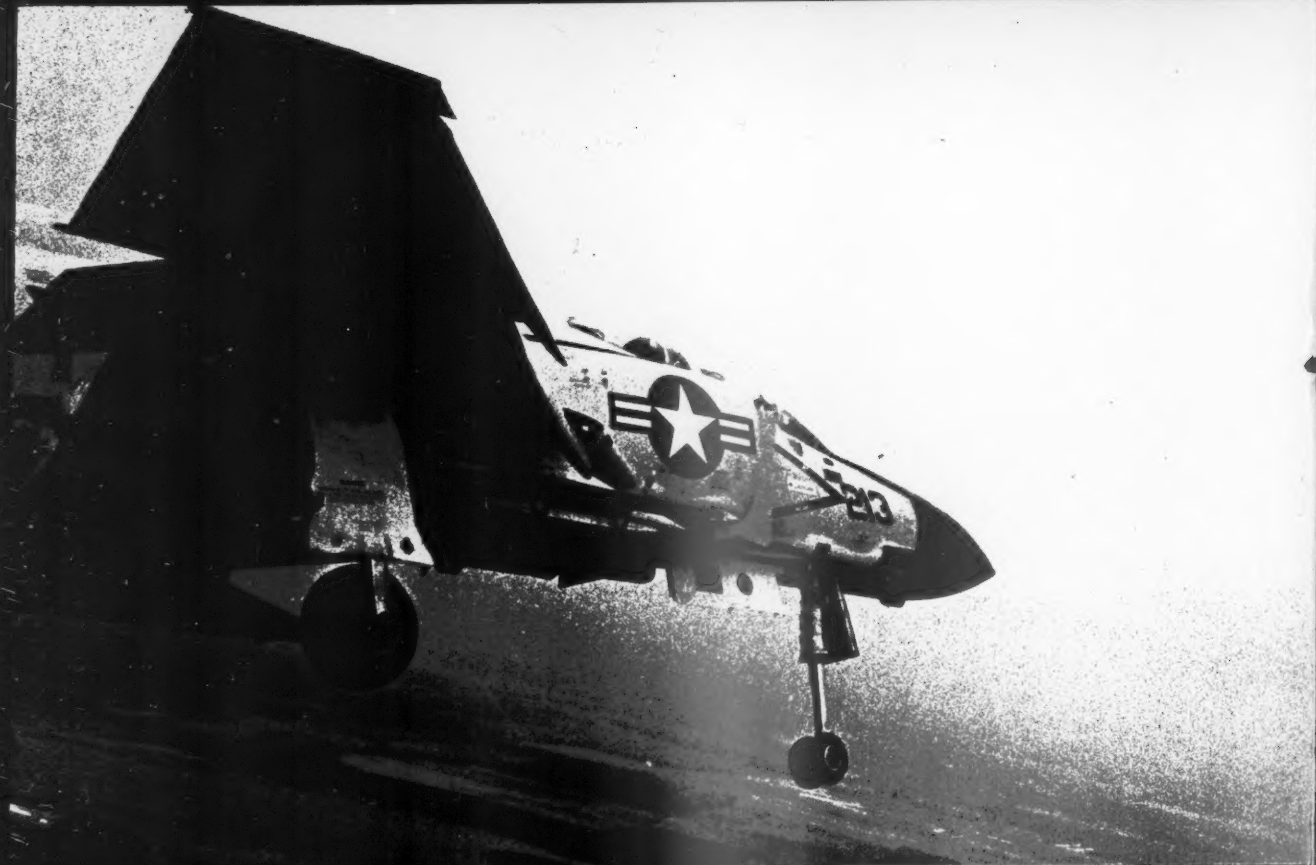
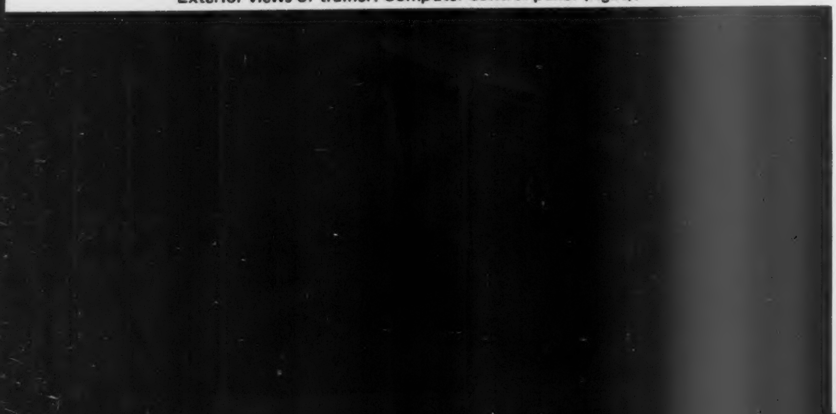
In This Issue:
A Quiet Revolution



Exterior views of trainer. Computer control panel (right).



A QUIET REVOLUTION

Or – There's A Simulator In Your Future

A QUIET revolution is shaping up in aviation training. More and more training is going to take place in flight simulators as opposed to aircraft. There are many reasons, not the least of which is cost. Training in flight simulators can be accomplished at a fraction – often as little as 10 percent – of the cost of training in aircraft. According to published reports, the General Accounting Office has estimated that flight simulators and other synthetic training devices have a potential to save the armed forces up to a billion dollars per year.

Our civilian friends – the airlines – who must operate on a strict profit and loss basis, have been in the forefront of developments in the use of flight simulators. The proportion of training in flight simulators has been steadily increasing, while training in aircraft has been declining. Not only must airlines expend a great amount of money for each hour an aircraft is used for training, they must forfeit up to $100,000 per day in lost revenue when an aircraft such as the 747 is out of airline transport service.

Of course, tactical aviation and carrier ops are a long way from the mission assigned commercial air. But, the cost of new aircraft such as the F-14, F-15, B-1, and S-3, demands that we examine all feasible ways to constrain the expense of

Operator/instructor console.

Operator/instructor console left center; trainee booths around perimeter.

initial training and exposure to risks.

Still another factor is the considerable cost in fuel, which promises to be more and more important in the face of a long term energy crisis.

Cost alone is inadequate as a determinant of the training provided naval aviation personnel. There is a firm requirement that the training be effective. Fortunately, a mass of evidence proves that the use of simulators makes every flight hour considerably more productive. In fact, synthetic training devices can, in many cases, provide real advantages over actual aircraft training operations. Take emergencies for example. There are some emergency operations which are simply too hazardous to practice in aircraft. Complete engine failure on takeoff and ejections are two such emergencies which come immediately to mind.

But the advantages of synthetic devices are by no means limited to hazardous situations. Modern devices incorporate numerous features which enhance training. The training problem can be "frozen" at any stage, and an instructor can point out errors or assist the trainee in arriving at a correct solution. Equally important, the newer devices provide the student with a critique of his performance at the end of a problem. This may be in the form of a printout or a readout on a cathode ray tube. Educators agree that such feedback is essential to the learning process.

Another plus for synthetic training devices is the fact that the entire training session can be spent on the desired training. This eliminates time spent getting clearances and proceeding to an operating area where the selected training can take place.

Naval Aviation Devices

Thousands of synthetic training devices are in use in naval aviation today. These range from simple mockups costing tens of dollars all the way to complex weapon system trainers costing millions. In between these extremes are devices such as cockpit procedures' trainers, which serve to familiarize a student with cockpit layout, to trainers for complex operational tasks.

A good example of a task trainer is the multimillion dollar device – 1D23, Communications and Navigation Trainer – recently installed at VT-10 at NAS Pensacola. This 40-station trainer is designed to train student NFOs (naval flight officers) in the development of skills and techniques required for the accurate use of current airborne communications and navigational aids. It has the capability of simulating typical naval aircraft operation with respect to basic aircraft performance, fuel consumption, radio communication, and navigation systems operation. The device consists of 40 trainee stations, six instructor/operator stations, a complex of

Operator/instructor console.

Trainee station.

minicomputers, and necessary interface equipment.

A feature of the trainer is the ability to evaluate and critique trainee capability and performance. The instructor/operator stations have the capability, at the end of a programmed lesson, to present a static pictorial presentation of each trainee's performance on the cathode ray tube display for post-mission critique. In addition, the device can provide a hard-copy printout of each trainee's performance. The printout lists significant events, time, performance measures, and standards of performance.

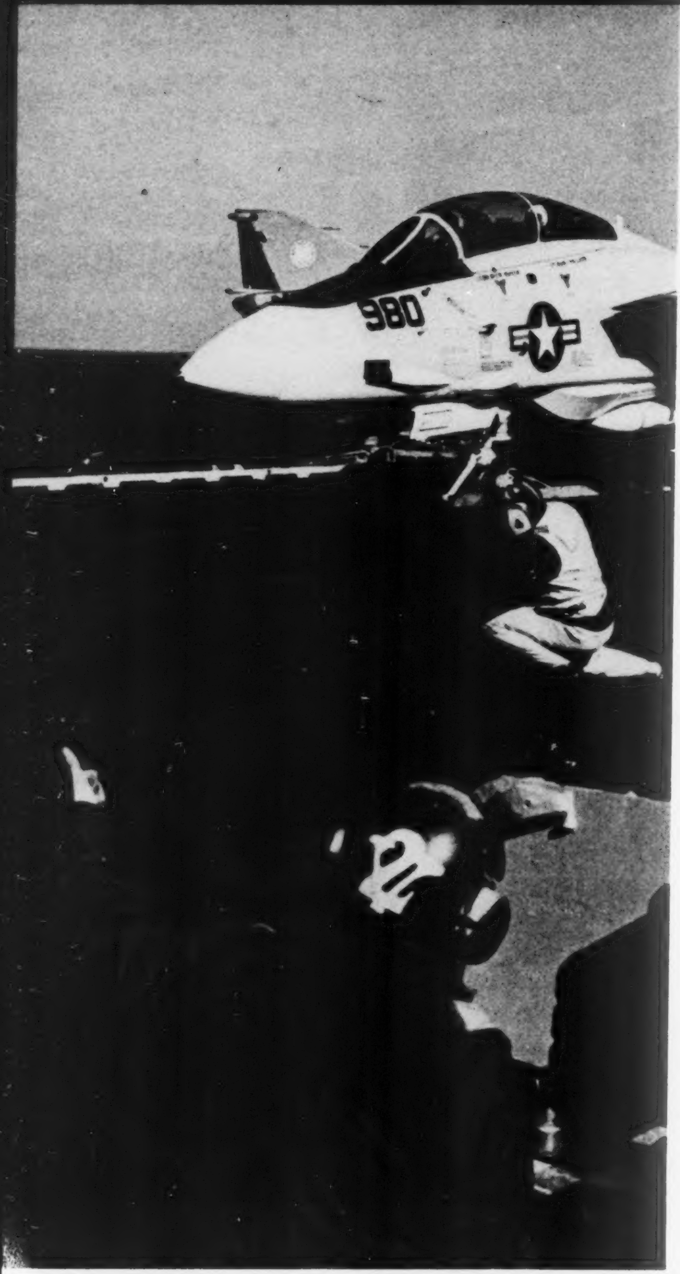
Another device which illustrates the advanced state of the art, as far as the Navy is concerned, is the F-4J Weapons System Trainer, Device 2F88. One unit is installed at NAS Oceana and another at NAS Miramar. This device simulates almost any mission of the F-4J aircraft, beginning with a "launch from the catapult" of a carrier and ending with a totally automatic (Mode I), hands-off "landing back aboard." Students vary from those in initial transition to fully experienced pilots in the refresher phase.

All aircraft tactical, flight, and navigational systems are simulated. The device cockpit is an exact replica of the aircraft cockpit and is mounted on a four-degree-of-freedom motion base. The motions simulated are pitch (± 15°), roll (± 15°), lateral (± 15 inches) and heave (± 12 inches). All normal aircraft sounds (engines, wheels, tire screech, aerodynamics noise, and radio static) as well as armament sounds (missile launch and gun firing, sidewinder tones, ECM, and ECCM) are realistically simulated to enhance training. Environmental simulation includes the oxygen and G-suit systems as well as exterior side effects such as clouds and lightning.

Total simulation of the aircraft's data link system is provided. This includes the AWCLS (all weather carrier landing system), NTDS (naval tactical data system), ATDS (air tactical data system), and the MTDS (marine tactical data system). Inherent in the data link simulation is the capability of assigning simulated air, ground, and sea targets to the aforementioned systems. The information presented to the pilot and RIO is, therefore, such that all aircraft instruments respond correctly, providing total tactical data link simulation from takeoff to touchdown.

The radar landmass simulator, coupled with a total ECM/ECCM simulation package, simulates operations over enemy territory. Up to 10 SAM (surface-to-air missiles) sites or other electronic emitters can be provided, as can airborne intercept radars, jammers, and stealers, to permit maximum training in these critical areas. SAM missiles of varying types can be "fired" at the trainees and, if the crew fails to perform properly, their *Phantom* will be "destroyed." The tactics instructor has the capability of either flying the air targets manually or letting the preprogrammed missions do it for him. Again, if the trainees perform properly, they can "destroy" the air targets (up to five) utilizing Sparrow or Sidewinder missiles.

The instructor console contains several innovations. Over 200 malfunctions may be inserted by preprogram on a time basis or at the push of two switches anytime. These malfunctions vary from the simple popping of circuit breakers to the complex system malfunctions of oil pressure which, after 4.5 minutes of continuing flight, results in engine seizure, loss of hydraulic power, and many other failures of various subsystems. The flight instructor's performance measurement panel permits monitoring 10 different flight parameters and provides teletype printout when present limits are exceeded. The panel scores the crew on missile firing and bomb release, indicating either a kill or



a teletype printout of parameter errors when a miss is scored.

A complete library of over 300 radio stations is provided in computer storage. These stations are a mix of TACAN, GCA, UHF, and ADF, and are programmed to appear at the proper locations as the aircraft flies anywhere in the world.

A tactical SDI (situation display indicator) as well as a ground track recorder are provided for the instructor's utilization during problem operation. The SDI indicates the location of all air and sea targets within a 400-mile square, and a 100-mile square is also available for use during air combat maneuvering. The ground track recorder may be utilized in either an approach or a cross-country mode utilizing one of 40 selectable sites.

The Outlook

New major Navy training devices are under development, scheduled for delivery within the next 2 or 3 years. These include an ACM (air combat maneuvering) trainer, a universal NCLT (night carrier landing trainer), and weapon system and operational flight trainers for the F-14, S-3A, P-3C, SH-2F, and SH-3H aircraft.

The outlook is for increasing use of flight simulators in both the aviation training program and the Fleet. Of course, much remains to be done before the maximum benefit will be realized. Aircraft, flight simulators, and other synthetic training devices (visual aids, programmed learning texts and machines, procedural and task trainers) must be fully integrated into a training *system*. This entails additional research into the transfer of learning and some trial and error in the preparation and execution of training syllabi.

There exists a limited program of certification for both training devices and instructors. Both these programs need to be expanded and formalized with universal certification criteria. A program similar to the NATOPS program for aircraft has been suggested.

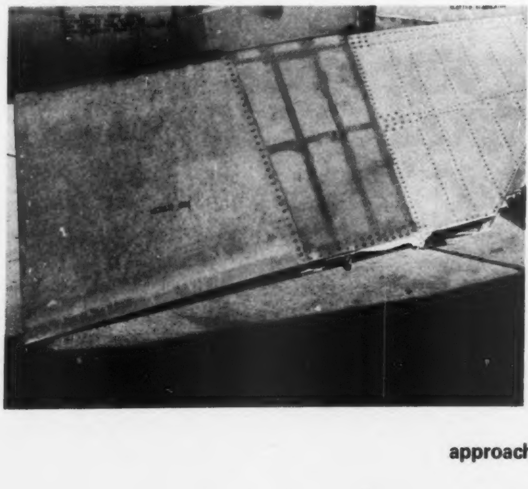
Basic advantages of flight simulators (e.g., safety, lower costs, and freedom from the constraints of bad weather and other operational impediments) must be fully exploited. There is reason to believe that synthetic training devices can be utilized on an around-the-clock basis, if sufficient effort is made.

A sign of the times is CNO's recent action in authorizing substitution of simulator time for a portion of flying time for those aviators participating in the proficiency flying program (refer to OPNAVINST 3710.7G). Currently, 10 percent of the total annual minimum flight time requirement and 25 percent of the total annual minimum instrument flight time may be performed in specified simulators. The instruction notes that all requirements for instrument ratings and NATOPS aircraft qualification must be flown in aircraft, but states: "As additional simulators become available and more is learned on the 'transfer of learning' gained through the use of simulators, this program will be expanded." There's a simulator in your future.

The February 1972 APPROACH contained an article on the A-7 NCLT (Night Carrier Landing Trainer). This month's cover depicts the proposed F-4J NCLT currently in development. A future article will discuss what we've gained from the A-7 NCLT during the past two years and the outlook for these simulators. – Ed.

Bob-Tailed PHANTOM

TWO F-4Js launched from KITTY HAWK on a short cycle to engage in section maneuvering. The first engagement was concluded normally. On the second hassle, the pilot of the lead *Phantom* noticed a slight pitch down and roll to the left during commencement of an oblique loop (Mach .88, 14,000 feet, 40,000 lbs gross weight, 5G). The pilot attributed this phenomenon to transonic Mach effect, so he continued the maneuver to the inverted position (200-250 KIAS, 18-20,000 feet) where the aircraft departed from controlled flight. Recovery was initiated immediately. The *Phantom* was slow to respond to full forward stick, but recovery was accomplished thus terminating the maneuver.



After joinup, the wingman reported both outer panels of the stabilator outboard of the stainless steel panels missing. The remaining inboard sections appeared to be structurally intact.

The bird was slow-flighted at 10,000 feet, 35,500 lbs gross weight. With gear down and flaps up, adequate longitudinal control was available down to 190 KIAS (18 units angle-of-attack). Pitch control from 18-20 units AOA was marginal. At 20 units AOA, the stick was approximately 1 inch from the aft stop, and pitch rate control was unsatisfactory.

Upon actuation of half flaps at 17 units AOA (gear down, corner reflector in), the aircraft immediately pitched nose down. Full aft stick had no noticeable effect on pitch rate. As the nose passed 30 degrees below the horizon, gear and flaps were raised, resulting in a 45-degree nosedown recovery. Altitude loss was approximately 3500 feet.

The aircraft was diverted for a field landing. A gear down, flaps up approach was flown at 210 KIAS (about 15 units AOA). A flare was initiated in close to touchdown at 18 units AOA (190 KIAS). Rollout was uneventful, and terminated in a midfield arrestment.

Preliminary investigation indicated the probable cause of failure to be stress corrosion cracking between the stainless steel and aluminum honeycomb sections of the stabilator. AFC 561 (titanium skin) will help this problem.

Submitted by the *Fighting Aardvarks* of VF-114

AIR BREAKS

4 Tires 4. It isn't easy for a pilot of a CH-53 to bust four tires at once, but one guy managed to do it. He had picked up 30 passengers at Point Able and took them to Point Baker. Upon landing, the aircraft bounced into the air and came down on an arresting cable – popping all mainmount tires.

The pilot had not released brakes before departing Able and did not use the landing checklist prior to landing.

Proficiency Flight. The U-11 Piper *Aztec* is built low to the ground. At certain times, this has definite disadvantages.

For example, the pilots of a U-11A were shooting GCAs to touch-and-gos one day. The copilot shot the first two. On his second approach, he landed long, but just short of the M-21 arresting gear. At touchdown, the nose gear contacted the cable that was being held off the runway about 4 inches.

A loud thump was heard by both pilots, and the aircraft swerved right. The pilot took control, stopped the swerve, and waved off. He called Tower and suggested a runway check for FOD. The tower called him after an inspection and advised that his nose gear was in trail and that a microswitch cover and nut had been found on the runway.

The pilots attempted to lower the nose gear by all methods, but were unsuccessful. After the runway was foamed, they landed, main gear down, and slid to a stop. They left the aircraft uninjured.

The polyurethane supports which keep the cable off the deck had caused the damage to the *Aztec* gear. The supports are located 7 feet either side of the centerline leaving very little margin for error for aircraft with narrow landing gear.

Ah . . . Da . . . Chee. "Both excuses and explanation are totally elusive to me. Two pilots qualified in model and an aircrewman failed to inspect an important area. This command was extremely fortunate in having undergone the learning process without more dramatic, costly, and tragic results."

The above endorsement was made on an incident report of a TH-57A. During takeoff, the pilot lifted into a hover and felt resistance aft. He lowered collective and landed. The engine was shut down, and the aircraft inspected.

The aft mooring point was found to be torn from the helicopter. During preflight, both pilots and the crewman failed to see a chain tiedown from the aft mooring point to a padeye directly below the mooring point.

Bucking for JG. A pilot shut down his *Huey* to unload some internal cargo. When he climbed out of the helicopter, he pushed the door closed, but it didn't latch.

Another *Huey* arrived a few minutes later carrying an external load. This pilot, with complete disregard for the first helicopter

and ground personnel, air taxied too close.

As a result, the parked aircraft had a door blown open and torn off its hinge by the rotor wash of the hovering helo.

Also, personnel unloading the first helicopter were peppered and stung by flying debris.

The lieutenant (bucking for JG) was saved from being banished to Siberia by virtue of the fact he was already "there."

Look Alive. The crew of a CH-46 was on a practice VERTREP, hovering about 15 feet over the flight deck, attempting to hook up a load. Now, VERTREP practice and the real thing get a wee bit hairy on occasion – like in rough seas.

The helicopter was hovering 90 degrees starboard of the ship's heading when the pilot responded to a low and back signal from his crewman and the LSE. As he changed the control inputs, the deck pitched up. The crewman hollered for more power, but not in time. The combination of a pitching, rolling deck and low hover altitude caused the helo to hit the practice load.

Any VERTREP pilot will recognize the importance of coordinating altitude and position. Proper altitude must be maintained even in calm seas, but especially in rough seas. The degree of difficulty in following LSE signals with the helicopter perpendicular to the ship (extended out over the side) is great. Team coordination of VERTREP crews is a must.

No Excuse. (For P-3, C-118, and C-130 types only) (Info C-117/131 types, too)

WHO: 1 PPC, 1 copilot, and 1 F/E (flight engineer).

WHAT: Postcalendar inspection functional checkflight.

WHERE: Airborne – 10,500 feet, 200 KIAS, out over the briny.

WHEN: In VFR conditions, one fall afternoon.

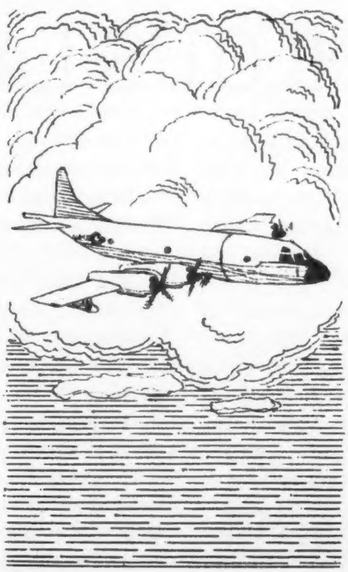
WHY: Mechanical feather check of one or more engines.

HOW: Several goofs.

The crew was conducting prop normal and mechanical feather checks at altitude. After a satisfactory normal shutdown and restart, the No. 1 engine was secured a second time for a mechanical feather check. While completing the mechanical feather checklist, the flight engineer *inadvertently secured No. 2 engine fuel and ignition switch.* The PPC then directed No. 2 prop to be feathered. No. 1 restart was completed, followed by No. 2.

Later, during the same evolution, No. 4 prop failed to function correctly during its mechanical feather check. After the E-handle was pulled, RPM stabilized at 21 percent. When the prop feather control circuit breaker was reset, the prop failed to feather, and the feather button light failed to illuminate.

The PPC commenced prop-fails-to-feather procedures. The flight engineer, however, did not ascertain that the feather button was IN and lightoff occurred when the E-handle was pushed in. The No. 4 engine started normally. Since a satisfactory, normal feather check had preceded the mechanical feather check and all instruments/circuit breakers appeared normal, a second mechanical feather was completed satisfactorily.



A thorough inspection by experts of the prop, prop control, and associated linkage revealed no discrepancies. It is theorized that No. 4 prop failed to achieve an RPM below the required 10 percent because of trapped air in the feather valve housing. This trapped air could have likewise caused the feather failure, once the feather control circuit breaker was reset. In such a case, however, the feather button light would have illuminated. The possibility exists that a worn circuit breaker may have denied power to the feather pump. The No. 4 prop control circuit breaker was replaced and a recheck of the No. 4 engine was normal.

There was a serious breakdown in crew coordination behind this sequence of events. Flight engineers must not act first and ask later. Even during a real emergency, flight engineers should not react without the concurrence or direction of the PPC. The professional way is to calmly run through the appropriate checklist.

Securing the wrong engine on a maintenance checkflight is inexcusable. The CO reported he was reviewing maintenance check flight procedures, including the designation of maintenance check F/E, and the squadron pilot/flight engineer training program to rectify the procedural errors that occurred.

This Anymouse report suggests several points for discussion, not the least of which is the need to report all mishaps for the benefit of others. Whatever direction our safety effort takes, it is essential that the program be uniformly applied, without fear or favor. There are other points, but . . . read on.

ONE PILOT'S LAMENT

THE INFORMATION enclosed is from an incident report that was never submitted because the pilot involved was a senior officer in a responsible position who had had a major accident the previous year. Being a junior officer and having seen this done makes me wonder how many times this is attempted/accomplished.

In the past couple of years, an enormous amount of emphasis has been put where it is needed – *on safety.* But more often than not, the same old threat comes out: "We must not have any more accidents . . . so the next pilot who does have an accident will automatically get a board." Two comments concerning this

First, pilots are human beings like anyone else who does a job, and unfortunately, they do err. I wholeheartedly agree that one error may be fatal, but this is known by all aviators. The idea of flying with the knowledge that a board will automatically convene, no matter if the accident is a result of mechanical or human failure, takes the enjoyment out of the job. A board means to me, as it did in the training command, that you're deficient and your airmanship is in question.

Secondly, if it is felt that the threat of a board is needed to keep the accident rate down, then when a senior says, "The next pilot that has an accident . . . " it should mean exactly that. The *next pilot,* be he senior or junior.

Personally, I feel the enjoyment of flying is being drained slowly from the new aviators. Positive control, etc., has taken away the "good ole days" that some of us remember, but which the new pilots hear about only at happy hour. At least, let us keep the pleasure of climbing into an aircraft and flying it to its known limits

with our known abilities, without a board hanging continuously over our heads.

Anymouse

The Alleged Incident from "One Pilot's Lament"

The aircraft involved was an A-7 flown by a pilot who wasn't a member of the squadron. The pilot had logged 7.1 hours of flight time in the A-7 within the preceding three months. This involved four flights which included one hour of night time. The pilot had also completed the instrument RAG three weeks prior to the incident.

The damage was a 3 x 5-inch tear and dent in the leading edge of the intake, two 1-inch tears in the ECM antenna cover, and two blown nose tires and broken nosewheels.

The pilot was returning from an instrument roundrobin and was executing a night GCA to a final landing. The weather was 900 foot overcast, 2 miles visibility in drizzle and haze, wind 40-degree left crosswind at 12 knots. At one-half mile, the pilot took over visually, but the bright glare from the high intensity approach lights and water on the windscreen degraded the landing perspective normally obtained from runway lights. The mirror landing aid was obscured by rain and glare.

The pilot attempted to hold a normal descent using the HUD. After passing clear of the flashing approach lights, the pilot noted what appeared to be a slightly low approach perspective from what he thought were runway lights and then heard a below glide slope call from the controller. The pilot stated that the runway lights were badly obscured by rain on the side windscreen panels. He decided that a landing short of the normal GCA touchdown point would be acceptable. Power was added to adjust for what he thought would be a touchdown point just past the threshold. Immediately after touchdown, the pilot felt the aircraft roll over what he thought was the arresting gear followed by a series of smaller bumps. As the small bumping action continued, the pilot saw for the first time dim green lights passing under the nose of the aircraft. The remainder of the rollout was normal. The pilot informed GCA that he had landed in the overrun then switched to tower frequency.

Investigation revealed that the touchdown point and initial rollout were short of the runway. The lineup lights are flush mounted and set in concrete pads. Ruts made by the landing gear were 6 inches deep at touchdown. At the first pad encountered, the nose tires were 1 inch below the pad and the mainmounts were 2 inches below. For the remainder of the pads, all depressions were about 1 inch deep.

At 550 feet from the runway, the aircraft struck a radar reflector mounted on a 7-foot section of pipe. This resulted in damage to the starboard intake lip.

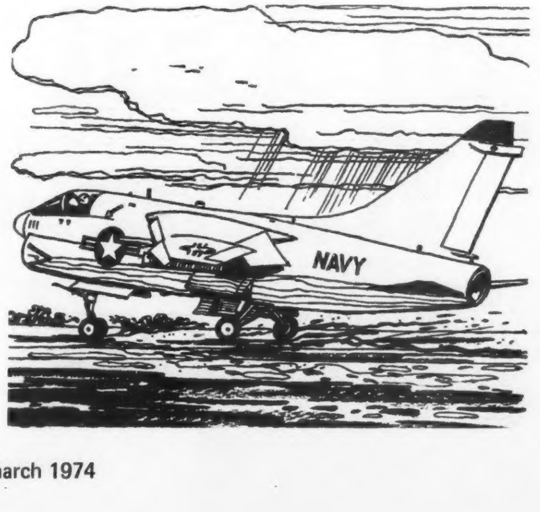
Following the mishap, the pilot checked to see if the rain removal system was working, but no evidence of hot air was detected. The system had been turned on at about 700 feet in the approach.

Three possible cause factors were apparent in the mishap. First, there was a moderate to heavy drizzle present at the time of the incident. It is well established that in such conditions the forward visibility is poor in the A-7, particularly without the benefit of the rain removal system. There is little doubt that this presented a problem to the pilot. Secondly, the approach lighting intensity is necessarily high to present lineup information as early in the approach as possible. The brilliance of the lights, however, is highly distracting in close. It is entirely possible that the combination of brilliant lights and rain on the windscreen seriously degraded the pilot's ability to see the runway lighting which in turn degraded the approach perspective.

Finally, the pilot's reactions to these problems were considered. From previous experience, the pilot believed the glare would subside after passing the sequenced flashing lights. His decision to continue the approach was correct. Instead of letting the glare problem direct his concentration from the GCA controller's advisory calls, however, the pilot should have used this information for assistance in the visual portion of the approach. (The decision of the pilot to attempt a landing short of GCA touchdown point is considered incorrect.) The runway was 12,000 feet long, and aircraft stopping distance was not a critical factor.

A significant issue is the fact that the pilot thought he was touching down between the runway lights. Whether the illusion was caused by a distorted perspective, a misinterpreted perspective, or possibly light reflections on the windscreen, could not be determined.

In conclusion, the cause of this incident was the pilot, with weather and airfield facilities contributing.



The Mystery of Tail Rotor Droop

By CAPT A. R. Barbin, USAF

THE WELDED-WINGERS (who've never experienced the joys of rotary-wing flying) do seem to agree that somehow the main rotor creates lift and forward motion. Most aren't sure what the tail rotor is designed to do. But you veteran helicopter pilots could easily enlighten your fixed-wing brothers about that little fan on the back. Or could you?

Because the main rotor is your so-called stem of life, you helo drivers are pretty well versed on the aerodynamics of the big overhead prop and its associated problem situations – low RPM (droop) and blade stall. Most chopper pilots can give a rather detailed explanation of the normal functions of the tail rotor, but the subject of tail rotor operation during main rotor droop seems to be a more mysterious area into which few, without aeronautical degrees, seldom venture.

There are a number of reasons for this lack of understanding. To begin with, the relationship is somewhat complicated, and its critical characteristics vary between helicopter type and model. And, too, actual flight test data under critical conditions is not available. Take the H-3 for example. No flight tests to accurately measure tail rotor thrust effectiveness have been conducted, so operating limits and procedures are based on data compiled from test stand operations. During normal operations, when main rotor RPM limits

are maintained, tail rotor thrust and response are adequate and do not present a problem. In fact, it wasn't until after an H-3 accident last year that tail rotor ineffectiveness was recognized as a potential accident factor for this aircraft.

Basics

On American-built, single-rotor helicopters, the main rotor system rotates counterclockwise, and the power applied to the main rotor generates torque which tends to rotate the fuselage in the opposite direction. You learned this in helicopter training. The primary function of the tail rotor is to counter these effects of twisting force.

To counteract torque developed by the main rotor, the tail rotor is extended on a long arm (tail boom) and driven at a much higher RPM than the main rotor. This is done through drive shaft linkage and gearboxes connected to the main rotor transmission. Tail rotor thrust output may be varied through directional (rudder) pedal displacement by the pilot. In this respect, the tail rotor also controls pivotal hover maneuvers and assists with inflight turn coordination.

In one recent accident, the helicopter began an abrupt right turn during takeoff from a mountain landing zone. The pilot, assuming tail rotor control had been lost, reduced collective and crash landed. The investigation revealed no discrepancy with the tail rotor or related components.

What, then, had caused the helo to react as though tail rotor control had been lost? The answer is relatively simple; the rotor RPM had decayed during the high power requirement on takeoff. This resulted in a corresponding tail rotor slowdown and, consequently, insufficient antitorque thrust to keep the nose of the helicopter from turning abruptly.

This mysterious phenomenon is called tail rotor ineffectiveness. It happens, as it did in this accident, when antitorque capabilities of the tail rotor are exceeded.

Droop and Engine Response

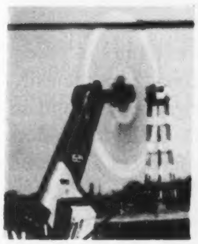
Decay of main rotor RPM (droop) and the corresponding partial or complete lack of tail rotor effectiveness is exaggerated during operations at high altitudes, high temperatures, and high gross weights. Decreased air density requires an increase in the angle-of-attack of the main and tail rotor blades. This causes high drag and increased power demands. Since main rotor demands automatically regulate engine power output, the engine(s) may be unable to provide enough power to meet main rotor power demands under the demanding conditions of high altitude, temperature, and weight.

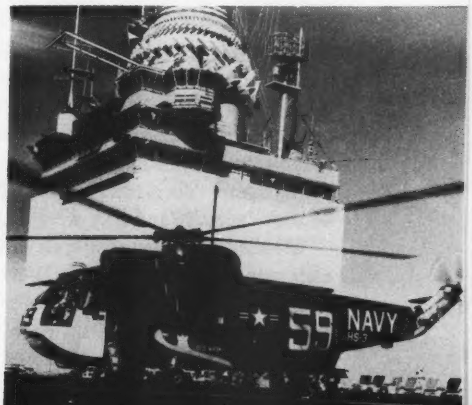
In such cases, with power output at or near maximum, main and tail rotor RPM decreases, resulting in severe droop; thus, tail rotor effectiveness decreases, and the nose of the helo yaws right. If rudder corrections fail to halt this turning, the pilot's only choice is to unload the main rotor blades and increase rotor RPM by decreasing collective inputs. This helps reduce aerodynamic loads on the main rotor blades and reduces power required and torque generation.

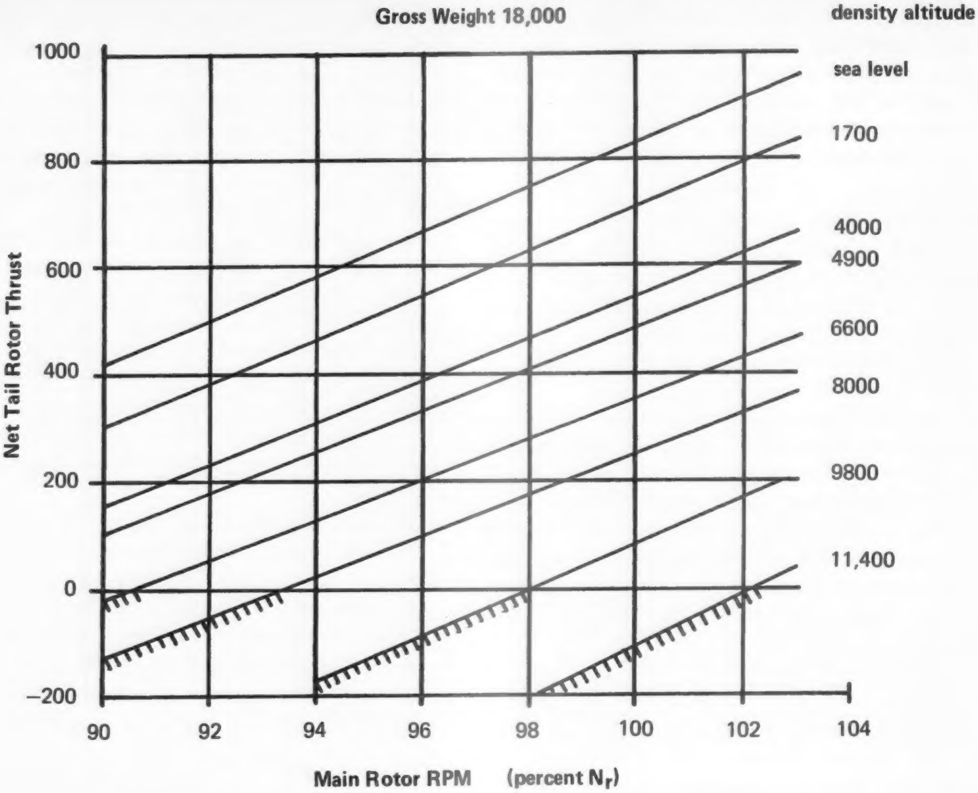
Rapid collective increases may also generate enough torque to exceed the antitorque capacity of the tail rotor. A sudden increase in collective could create an instantaneous decrease in main and tail rotor RPM and sharp increases in main rotor drag and torque. This can be of such magnitude that an abrupt torque increase could overwhelm the decreased antitorque output of the tail rotor.

Sharply increased power demands may temporarily exceed the engine's acceleration capacity. Depending on power settings, blade loading, rotor speed, true airspeed, temperature, and density altitude, it may require as long as 10 seconds before engine output can motor the main and tail rotor back up to speed.

Lack of tail rotor response occurs at predicted main rotor RPM. This RPM is based on temperature, density







altitude, and gross weight parameters. Figure 1 illustrates estimated tail rotor insufficiency data for the H-3. Test stand data has been compiled from sea level to 5000 feet at simulated speeds of 10 to 30 knots.

A tach gage in the cockpit indicates main rotor RPM (N_r) in percent. The importance of frequent reference to N_r during all phases of flight cannot be overstressed. Operation below rotor RPM limitations will produce a significant loss of lift, accelerated sink rate, and insufficient tail rotor thrust to offset the torque generated by the engine(s).

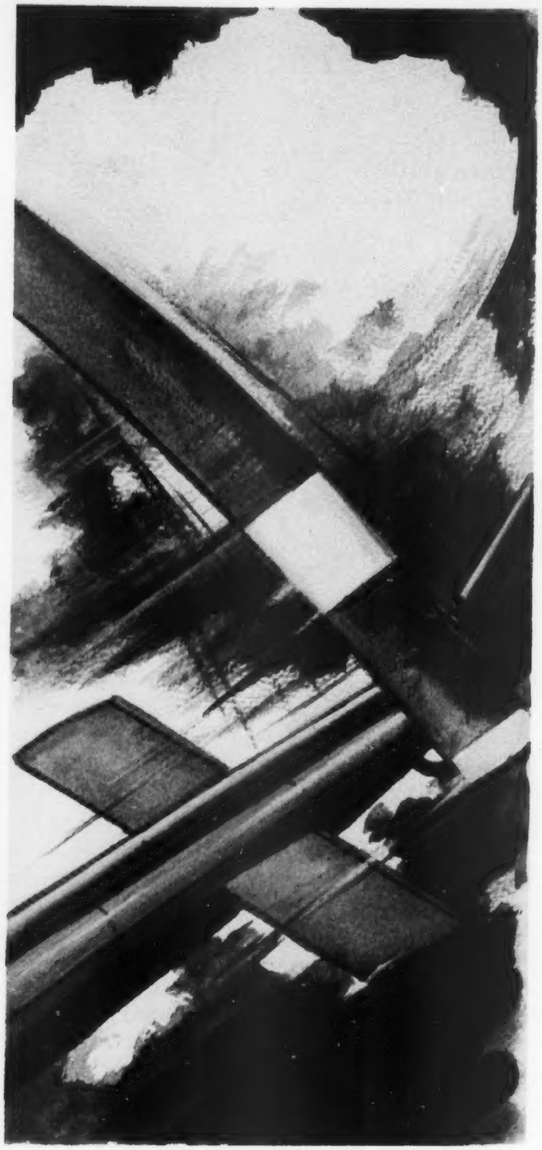
Maneuvers in helos often require extremes in power requirements and intense outside reference, particularly during CALs (confined area landings) and mountain operations. In several documented accidents, pilots became preoccupied with outside references and failed to recognize decreasing rotor RPM until the droop became excessive and they were unable to recover.

Modern fixed-wing aircraft are equipped with an elaborate array of high speed and stall warning systems designed to warn the pilot when the aircraft is approaching these limits. This is not true of all helicopters. Such warning systems might well help helo pilots avoid rotor droop and reduce accidents.

Precautions

- Prevention of main rotor droop and related problems is up to the pilot. He must be aware that the effects of high altitude, high temperatures, and high gross weights may place excessive demands on both main and tail rotor systems, the engines, and himself.
- Smooth collective inputs will help the engines keep pace with power demands of the main rotor. High rates of descent should be avoided because the power requirements of the rotor systems during level-off may exceed power available.
- Anticipating conditions that could cause rotor droop should begin during preflight planning. The flight profile should be analyzed, and performance computations must ensure that power available exceeds power required for all anticipated flight operations.
- Early recognition of rotor droop is essential to safely initiate corrective actions. If rotor RPM begins to decay rapidly during high power applications, then lower collective, increase airspeed, initiate a right turn to unload the tail rotor, and go around while there is still sufficient altitude. Attempts to salvage an approach to a hover or landing while experiencing a rotor droop will only increase chances of a prang.

Courtesy *The MAC Flyer*



More on Skid Operations

THE OFFICERS and men of the Air Department of INCHON wrote an article *Skid Operations Aboard the AMPHIBS* which appeared in the September 1972 APPROACH. Although the article was written primarily for other ships handling skid-configured helicopters, there was much good information for personnel of deploying Marine Corps helicopter squadrons.

The article points out there's lots of wind in winter months in a large part of the Mediterranean . . .

"High winds and heavy seas in the Mediterranean during winter months were found to be the rule rather than the exception. Steady state winds of 50 knots with higher gusts were frequent during November-January, particularly in the areas of Corsica, Sardinia, the western coast of Italy, and the southern coast of France."

A recent mishap report was sent by an embarked unit because an aft main rotor blade tiedown failed, allowing one rotor blade to impact an adjacent helicopter. The aircraft had experienced winds of 49 knots about 50 degrees to starboard and was secured with fore and aft tiedowns. (The report didn't say how many.) The embarked squadron further reported that all H-1s are now being secured with a locally manufactured nylon web holder on each main rotor blade in addition to the two tiedowns.

It behooves deploying squadron personnel to have plenty of tiedowns available and to have them in good shape. It is also important to review tiedown techniques as well as aircraft deck spotting and deck handling procedures.

The article further states: "Securing the H-1 helicopters for protection against high winds and heavy seas proved to be easier than securing H-46s and H-53s. Eight point tiedowns . . . Aircraft were spotted fore and aft, nose toward the bow . . . Another equally successful method was to rotate the main rotor blade about 30 degrees from the helo's centerline and tie down both blades to flight deck padeyes."

Rotor engagement/disengagement is another hazardous operation. Wind limitations constrain all helo operations – ashore or afloat . . .

"As a general rule, winds of 15 knots or more may cause extreme dipping of the rotor tip path plane during engagement. The degree of dip will increase with wind velocity and the speed of wind gusts . . . The rotor is handheld as long as possible by a crewman . . . quite effective in winds up to 25 knots . . . above 25 knots the rotors may dip to within 4 feet of the deck . . . Particular attention should be paid to emphasizing this hazard to squadron personnel, as often they become complacent after spending many months operating ashore in low wind conditions . . . Embarked troops should also be made aware of this danger."

Every deployment exposes a large percentage of both ship's company and MAU (Marine Amphibious Unit) personnel to the rigors of rugged operating conditions for the first time. The more prior knowledge available to all hands, the better the deployment.

Reflections on Mortality

or How I Got the Commanding Officer to Stop Smoking Without Really Trying

By ASO Anymouse

THE CHALLENGE was evident to me from the start as I viewed my first AOM (All Officers' Meeting) since reporting back to duty in a first-line operational squadron. Most of the health-conscious flight crew personnel had the word, but that persistent percentage who didn't was quite obvious to the rest. The smoke hung heavy in the readyroom. My eyes smarted, and I breathed faster to stay alert and not miss some important word at that first meeting.

Cigarette in hand, the XO introduced me around and then pressed on to more important matters – quoting Plato and "Z" in the same sentence while wrapping up some of the skipper's less attractive projects. This is gonna be some kinda outfit, I recall thinking.

Later that same day, my future job as ASO was laid on me in a small, smoke-filled office. The XO mused on his days as ASO and the role safety plays in operational effectiveness. While I nodded concurrence, I noted the filled ashtray, half-empty cigarette packages, and the dingy smell. So strong was this man's attitude toward aviation safety that I knew I could count on 100 percent command backing. It was with only slight misgivings that I departed his office.

Safety School at Monterey was all one could hope for. Topless birdwatching and tennis filled the idle hours, while the school staff filled the rest. One such staffmember, Sotto Voce, MD, I vividly recall as he came down hard on those whose bad habits included that of smoking.

To Dr. Voce, smoking was a habit and not a form of addiction. It shortened lives, reduced lung efficiency, increased heart troubles, and did some things I can't even spell. Since I was a heavy smoker myself until formation stage at TRARON THREE, I mentally added a few comments of my own: stained fingers and teeth, husky voice and/or cough, plus a constant drain of ensign's pay. Those were the reasons I quit. In quitting, I discovered a feeling of pride knowing that I was now my own man.

My daydreaming continued as I recalled the instrument repairman who complained of precessing gyros caused by tar accumulations and my airline buddies who stuck their noses into tar-encrusted outflow valves but once. The buzzer signalled the end of class and snapped me back to reality with a vow in my mind to promote safety by becoming an active antismoker.

By now, my course of action was clear. In an effort to improve the health of my squadronmates, to improve their self-images, and for some other important reasons, I would actively promote a No Smoking policy in the command, and surely the cause of aviation safety would be furthered.

By now, there had been a change-of-command, and that 100 percent backing rose to 1000 percent. A politician would have been uneasy. Nevertheless, I pressed on with my plan . . . get the Old Man off the weeds and others must surely follow (as the night the day?) – a sort of nicotine domino theory.

My first efforts against him were sophomorish pranks like hidden ashtrays, "lost" lighters, loaded cigarettes, etc. I managed to remain covert through that first stage which only heightened his resolve and consumption (now 2½ packs a day).

Direct action was called for, so by screwing up my courage and utilizing my direct access rights, I entered his office. We covered a lot of safety ground (and several smokes) before I let on about my safety/smoking views. The skipper was momentarily taken aback by this Regular "lifer" talking like a Reserve on the current cutlist. He recovered nicely, as I figured he would, and gave me a group or two about business and pleasure not mixing. I was to MYOB while he was to "enjoy" smoking. End of safety conference . . .

The wounds of that encounter were on the mend when Mrs. CO decided on a dinner party for the squadron hierarchy (read, Department Heads plus wives). The affair was a smashing success with a little heavy talk and not a little frivolity. It was then that I hit him straight out with the "why don't you quit?" question.

In retrospect, I realize my impertinence, but . . . the opportunity presented itself, and I took it. Well, he told me the ability to kick the habit was all simply in the mind and that one only had to make the decision and it was done. I knew he was right because that's how I did it way back even BSGR (before surgeon general's report). I wondered how many times he'd made the decision. We chatted further about THE SUBJECT and

parted peacefully in the wee hours. The future looked good for his kicking the habit.

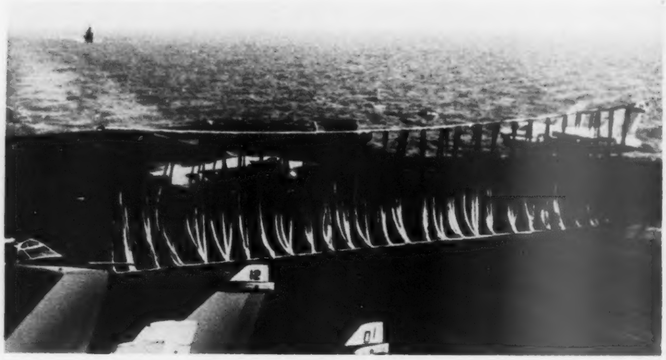
But it was not to be, for deployment came with its special annoyances, and consumption rose even higher. I figured I'd lost the war as I witnessed greater clouds of smoke at subsequent encounters. But, lo! A fantastic opportunity arose one mellow evening as Skipper-san issued me a challenge with a promise. The challenge: an article authored by me for submission to a recognized safety publication (with nary a mention made of a requirement that it be printed). The promise: he would stop smoking and, in addition, run a mile every day in keeping with the Navy's aerobics program. I must admit to being dumbstruck at his challenge and promises. Knowing that both goals, together, are out of reach of most mere mortals, I hereby absolve his adherence to the second promise, but the first remains.

Having just witnessed the most recent Arab-Israeli War, I more-than-ever appreciate the value of a preemptive strike. Hence, I'm bypassing the command chop(per) and admin shredder. Only three other people know that I've written: the Skipper; you, the editor; and a friend of mine.

And now I'll tell you why I went to this trouble. It's because a man of talent and intelligence has challenged me with his word which I feel is stronger than his hunger for cigarettes. He will be a better man for quitting, his family will enjoy his presence longer, and the Navy will have the services of a professional officer for as long as he is needed. The reasons I can speak with authority on this issue are two: first, my wife promised to quit smoking on our wedding day, and quit she did. Second, my father died in the prime of his life due primarily to a cigarette-induced heart attack. He was a heavy smoker who'd just passed his FAA First Class Physical . . . he is sorely missed.

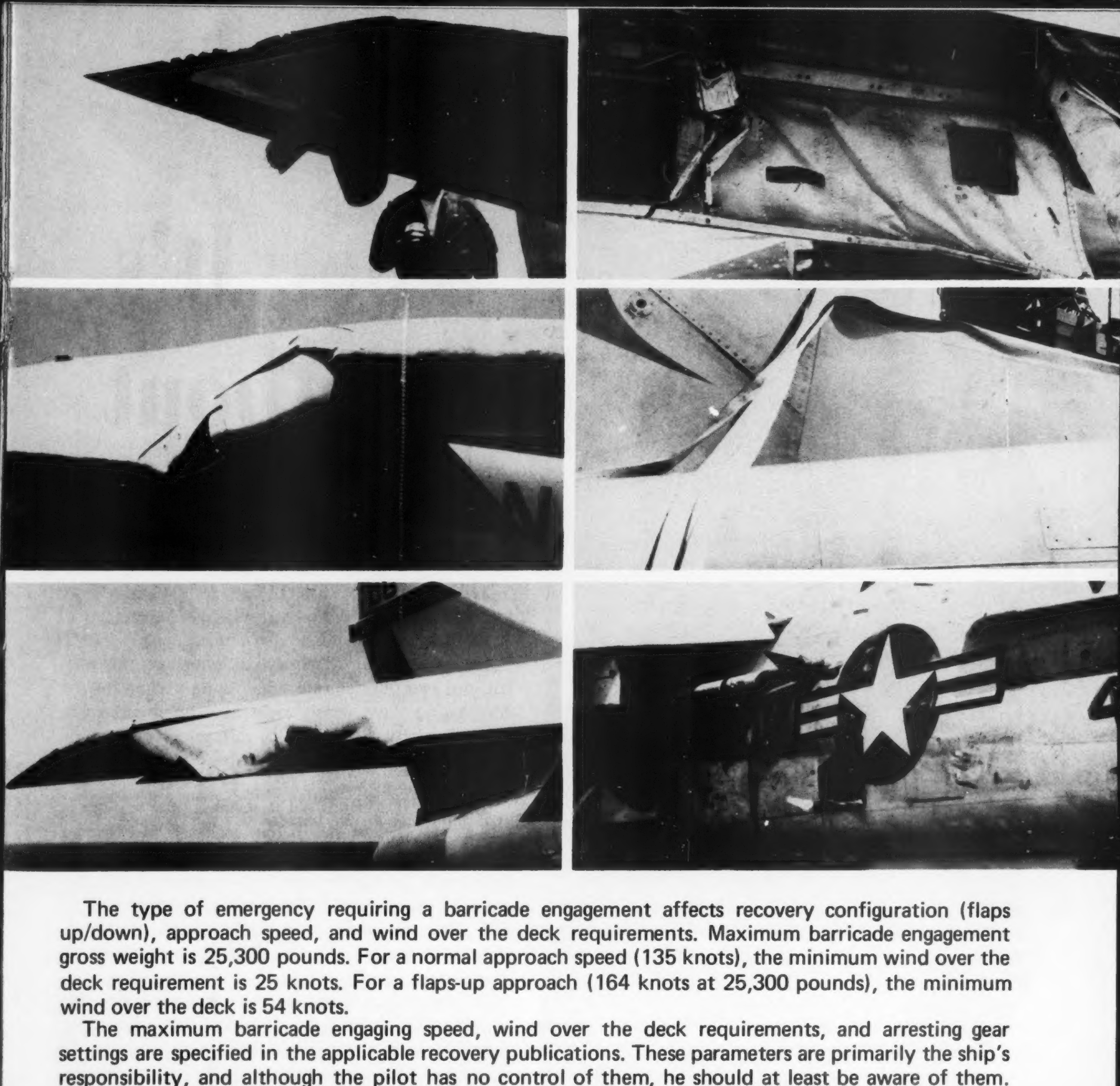
A-7 Barricade Arrestments

BARRICADE arrestments with A-7 aircraft have been minimal since fleet introduction in 1967. Six successful barricade arrestments have been made. Damage sustained from the barricade engagement has been primarily from strap engagement and is manifested in canopy and windscreen crazing, bent IFR probe, bent leading edge flaps, bent nose and main landing gear doors, torn EPP and EPP doors, bent UHTs, and bent vertical stabilizer.



A listing of the six mishaps and their incipient causes:

- *A-7B* – nose landing gear in 45-degree trail because of improper emergency extension procedures. MOVLAS used by LSO in recovery. Barricade arrestment and hook engaged #2 crossdeck pendant – substantial damage.
- *A-7A* – enemy AAA projectile entered starboard wheelwell deforming main landing gear cylinder and severing PC-2 pressure downline. Starboard main landing gear extended one-third. Barricade arrestment; hook failed to engage any of four crossdeck pendants – minor damage.
- *A-7A* – tailhook dropped into catapult track during catapult launch. Catapult shuttle ramp penetrated engine access panel, tail cone, and lower part of rudder. Four feet of tailpipe was lost, and the throttle support bracket was broken resulting in reduction of power available and limited throttle response. Barricade arrestment, no hook engagement – substantial damage.
- *A-7B* – oil pressure loss, flew 30 minutes on reduced oil pressure on return from combat hop. Barricade arrestment with #1 crossdeck pendant engagement – minor damage.
- *A-7E* – combat damage caused immediate PC-1 failure. PC-2 pressure lost when flap handle moved from ISO position – minimum control speed was 153 knots – barricade arrestment, no hook engagement – substantial damage.
- *A-7B* – during recovery from strafing attack, engine instability and compressor stalls commenced. Straight-in, flaps-up approach made (164 knots) to barricade arrestment, with #2 wire engagement – substantial damage.



The type of emergency requiring a barricade engagement affects recovery configuration (flaps up/down), approach speed, and wind over the deck requirements. Maximum barricade engagement gross weight is 25,300 pounds. For a normal approach speed (135 knots), the minimum wind over the deck requirement is 25 knots. For a flaps-up approach (164 knots at 25,300 pounds), the minimum wind over the deck is 54 knots.

The maximum barricade engaging speed, wind over the deck requirements, and arresting gear settings are specified in the applicable recovery publications. These parameters are primarily the ship's responsibility, and although the pilot has no control of them, he should at least be aware of them. Maximum barricade engaging speed is 110 knots; wind required is determined by how much the approach speed exceeds this limitation.

It is incorrect to assume that a lighter aircraft gross weight will have a higher permissible barricade engaging speed than a heavier gross weight. The number of straps cut on impact is a function of aircraft engaging speed and aircraft configuration. Barricade arrestment engine settings should be set at the actual aircraft gross weight vice the maximum allowable recovery gross weight.

Plan the actual approach to the ship to minimize any known aircraft problems. If controllability is affected, a long, straight-in approach should be made. Normal attitude and sink rates should be maintained. The lens will be lost in close, behind the barricade stanchion. A barricade arrestment should not be attempted if its success depends upon whether a pendant is also engaged. The engine should be secured at touchdown/arrestment vice accelerating to MRT.

No pilot injury has been sustained during any of the six A-7 barricade engagements. ◄

What It's All About

By LtCol J. Orr, USMC
Harrier Project Officer

THESE words of wisdom are, for the most part, imparted to the relatively small AV-8A community about flight safety in our unique airplane.

In reviewing *Harrier* mishaps, it is apparent that they fall into two obvious categories: those peculiar to the AV-8A and those which could have occurred in any tactical aircraft. Generally, the mishaps peculiar to the AV-8A were a result of either hardware malfunctions or errors in technique.

A glaring fact stands out in reviewing the mishaps in that the two strikes, out of four accidents, were caused by factors unrelated to VTOL/STOL flight operations (which sets the *Harrier* apart). For example, during BIS trials, an experienced, highly qualified, competent pilot flew into the water on a rocket run for unknown reasons. In the other, a large bird was ingested after a normal field takeoff.

It follows that the factors that can kill *Harrier* pilots and destroy aircraft are quite similar to those that have been around since Orville and Wilbur closed up the bike shop. Such things as midair collisions, fuel exhaustion, engine failure, etc.

The following philosophy is based on 15 years flying experience with the last 19 months as CO of an AV-8A squadron. In that 15 years, almost all of which has been in tactical flying billets, I have never been in a squadron where a pilot was killed. If some of my thoughts can help just one or two people make the same statement a few years from now, it will make this writing effort worthwhile.

Aviation safety is not, or I should say is more than, paperwork. Thorough investigation and surveys followed by letter-perfect reports are important, but along with

safety records and statistics and regular AOM tirades by the ASO, they represent only the tip of the aviation safety iceberg.

Aviation Safety Is A State of Mind

All the *lip service,* briefings, *threats,* and promises that a CO can make are useless unless every man associated with ground or flight operations is doing his best to make those flight ops as safe as possible. We have to convince everyone even remotely connected with our operations that he has an integral part in accomplishing our mission – while keeping our aircrews alive and our assets intact. The tower operator, cook, housing officer, and disbursing clerk can all contribute to or detract from the safety and efficiency of a unit. *A proud outfit with high morale is more than likely a safe one.*

Aviation Safety Is Knowing Your Job and Doing It Correctly

I refer primarily to the aircrewmen, technicians, and support personnel directly associated with aircraft operations and maintenance. As aircraft and systems have become more complex, we have become more and more reliant on NATOPS, checklists, SOP, MRC, and other gouges to ensure a particular evolution is done properly. In some cases, we may have tried to substitute programs for leadership.

No checklist could possibly cover everything, and in the final analysis, we are dependent on the judgment, skill, workmanship, common sense, and integrity of all for the safety and successful performance of our mission.

A viable and continuing technical training program combined with inspirational leadership can keep a man technically proficient and motivated to do his best. Both this proficiency and motivation are indispensible to safety and mission accomplishment.

Aviation Safety Is Good Communications

More than a few aircraft mishaps have been caused by ignorance on the part of one or more key persons. These have ranged from an ATC controller not knowing the weather outside or at a divert field to an aircrewman not knowing some peculiar flight characteristic well known in another squadron here or on the other coast.

We've made great strides in recent years with the NATOPS program, the UR and mishap reporting program, and other "pass the word" vehicles, but occasionally some vital piece of information will still "fall through the crack." The point here is that it is

everyone's moral obligation to ensure that his knowledge is passed around. Maintenance types, remember that a UR on a publication is perfectly acceptable.

Aviation Safety Is Not Being Afraid to Say "NO"

... to a young charger who isn't quite ready for the task or designation that he wants so badly, to the boss who's asked about a commitment for which his outfit isn't quite ready, to the mech who asks if "you'll take it the way it is," or to the VIP who can't get there on time by ground transportation. A number of my friends, whose faces are only a dim memory, would be alive and healthy today if someone had had the courage to say "NO." They might be selling shoes or real estate, but at least their widows wouldn't have had to raise the kids alone. A gray haired instructor, an ex-NAP, told our meteorology class in flight training that "It's a damned sight better to be down here wishing you'd gone than to be up there wishing you'd stayed."

Aviation Safety Is Having A Reason for Everything You Do

There are valid mission requirements for being able to fly and maneuver below enemy radar coverage at low altitude and V max – either VFR or on SRTC through the Smokies. There are just as valid reasons for ACM with dissimilar airplanes and for making a particular type takeoff, approach, or landing – but these maneuvers should be briefed, thought out, and practiced at the right place at the right time. They should never be done as "spur-of-the-moment" acts to satisfy some whim.

Fly the airplane so that if you were struck by lightning at any time during a hop you'd be able to explain to the folks at the long green table why you were where you were when you were. The pilot who jumps you in the holding pattern may be competent, and he may not. Even if you can hack a maneuver in the corner of the V-n diagram, how will you word your statement if the other guy has to shell out of a spinning multimillion-dollar airplane?

Aviation Safety Is Never Playing All Your Good Cards

Stated another way, always have a way out. Only a few years ago, most of our jets were beyond the abort point before they reached flying speed, and the dead man's curve for many helicopters enclosed a substantial portion of the flight envelope. Not only that, but the jet crew was outside the ejection (or bailout) envelope for the first thousand feet or so of the climb and the last couple thousand feet of the descent and landing. A crash landing in any jet was definitely hazardous to health.

We've made tremendous progress in airplanes and escape systems since then, but we still occasionally hear about some guy having to break approach minima because he didn't have the fuel to make an alternate or someone loading a helicopter or twenty-five-year-old transport to the point where failure of one engine could spell disaster. Most mishaps aren't caused by one single act or omission, but rather by a number of events which, in series, add up to an accident. Only by keeping open as many options as possible can a pilot prevent a single failure or unforeseen event from ruining his day.

Aviation Safety Is Never Having to Say You're Sorry

The job of telling Mamma and the kids that Dad won't be home – ever – is probably the most unenviable task that a CO can face. Knowing that it could have been prevented by a little extra effort and common sense would make the whole task even worse. And if you think you have plenty of work to do now, just consider throwing an AAR, casualty assistance calls, and a couple of memorial services on your calendar.

2nd MAW *The Hot Dope Sheet*

Skyhawk SKID

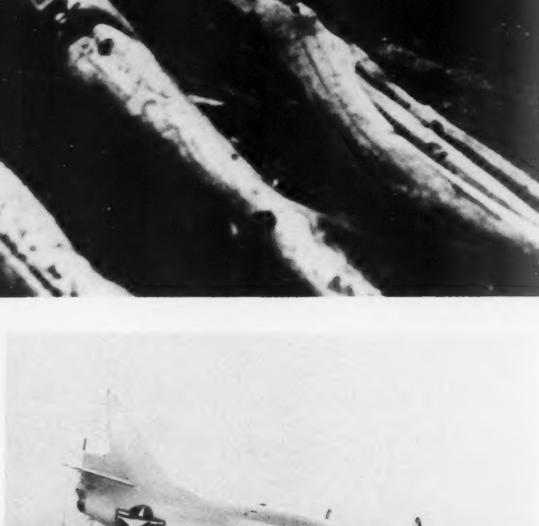
FOR those of us who are sometimes lured into the potential trap of the "standard brief, standard hop" syndrome, consider the following events:

LCDR Edward J. Ryan, a full-time flight engineer for a domestic airline, was completing the latter portion of his annual active duty training period with RTU-204. An ostensibly "standard" ordnance hop, not unlike hundreds previously flown, was immediately complicated by the "nonstandard" loss of the port main wheel assembly on takeoff. The catastrophic failure of a wheel bearing had left this Reserve aviator with the prospect of making an intentional gear-up landing to save the aircraft.

Fortunately, LCDR Ryan's professional skill was such that this hazardous condition merely resulted in a "routine" foamed runway landing. Aside from the droptanks, there was little damage.

(The lesson learned from this incident must necessarily fall under the category of self-evaluation. How well are you, as a pilot, NFO, or flight crewman, prepared for the unusual – the unexpected? Have you rehearsed your reactions to such "unscheduled" emergencies? How will your actions measure up to those who have dealt so successfully with unplanned situations? – Ed.)

YOUR UNDIVIDED ATTENTION



THE STRONG upward trend in FY-74 landing accidents continues unabated. The landing accident percentage of total accidents has risen steadily from 35 percent at the end of July to 42 percent at the end of December. The FY-73 percentage was 31. Had we been able to maintain 31 percent in FY-74, the accident rate would be 0.78, only slightly over the goal of 0.75 percent. The accident rate at the end of December 1973, however, was 0.88!

Nothing has changed in the landing pattern environment this fiscal year. Instead, some very basic techniques of airmanship have been ignored. Through 31 December, the major cause of these landing accidents has been the lack of proper pilot action after

touchdown. Nine aircraft left the runway on landing rollout and received strike or substantial damage. The old spectres of porpoise on landing, unintentional wheels-up landings, and poor CV landing techniques account for another 13 major accidents.

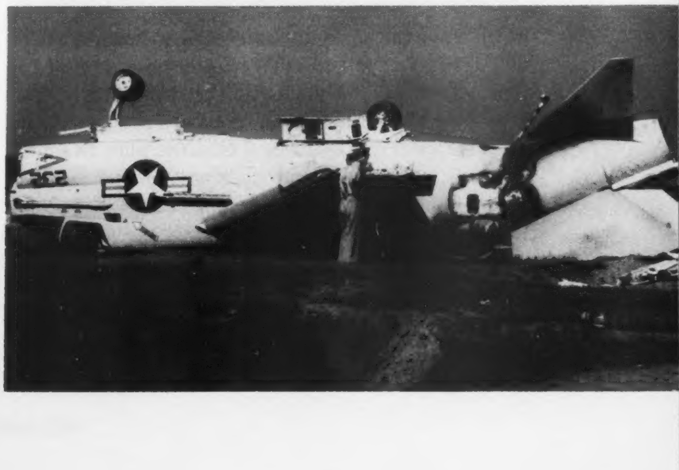
In addition, eight accidents which occurred in the landing pattern run the gamut of pilot error possibilities. The startling similarity among these landing accidents is their perpetuity; all of them have been experienced since the earliest days of naval aviation.

In summation, of 42 major aircraft accidents occurring in the landing phase, 30 have been confirmed or are suspected of having pilot involvement – a whopping 71 percent.

It is evident that a need exists for commanding officers to immediately appraise the knowledge of their aircrews concerning the basic procedures and techniques for establishing the proper landing pattern and landing the aircraft. Deficiencies can be expected in the following areas (numbers in parentheses show the major landing accidents in that area this fiscal year):

- *CV landing technique* (8): Pilot acceptance of a meatball not centered or use of improper procedures to center the meatball in close sum up these accidents. Discipline to fly the correct glide slope or wave off when unable is the key here.
- *Attention* (8): Distractions from landing airspeed, attitudes, and checklists are not moribund problems. They reappear whenever essential tasks get low priorities. Do first things first!
- *Wet runway landing technique* (4): In the coming months, runway conditions will still be poor, and wet runway landing techniques will often be critical. Procedures for directional control and for the prevention of hydroplaning on landing rollout should be reviewed.
- *Nosewheel steering functions and malfunctions* (3): The pilot must know when to use the system on landing rollout and must anticipate a malfunction with each use.
- *Waveoff criteria* (2): An aircraft malfunction often means a high landing speed and an arrested landing. What malfunctions preclude a waveoff if arrestment fails and justify an attempt to brake to a stop on a high-speed rollout? Each pilot must be certain of the criteria for choosing one over the other.

In summary, landing accidents are up in FY-74. Give each landing and rollout your undivided attention.



Inflight Engagement

F-8's do it, A-4's do it, they all do it!

ON THE second approach during carrier quals, the *Crusader* pilot made a good start and had a good pass going until he got in close. At this point, the LSO detected a settle and called for "a little power." The pilot was flying an APC approach and responded to the "little power" call by increasing his nose attitude and staying in APC.

One second after the "little power" call, the LSO detected that the settle was increasing and gave a hard "power" call followed immediately by two "waveoff" calls and simultaneous waveoff lights. The pilot applied 100 percent power. The sink rate was arrested, and the hook cleared the ramp by one to two feet. The bird's flightpath flattened with the hook one to two feet above the deck, barely clearing the No. 1 and No. 2 CDPs.

The hook engaged the No. 3 wire with the *Crusader* still flying. The aircraft then slammed down on the nose gear, which immediately collapsed. It came to rest on the main landing gear and the intake duct, with the nose gear shoved up into the aircraft fuselage abaft the nose wheelwell. The pilot secured everything and exited uninjured.

The mishap board stated in part:

"The pilot flew what he considered to be a good approach until he received a power call from the LSO, which he answered by increasing the attitude. A review of the PLAT tape and radio transmissions showed two clear power calls by the LSO. The first call was for a little power, and the second call was a positive 'power' call. Therefore, it is assumed that the pilot heard the first call 'little power,' but made an improper response, i.e., changed aircraft attitude letting the APC add power. LSO and F-8 NATOPS clearly specify the pilot will go manual and break out of APC upon hearing an LSO 'power' call. The pilot did not hear the second 'power,' and by this time, the approach speed had degenerated to a slow chevron and the aircraft attitude had increased beyond optimum. The LSO immediately waved off the aircraft, both verbally and with the fresnel lens waveoff lights. There is no doubt that this alert action by the LSO prevented a ramp impact accident."

It Can Happen to the Best

The squadron commanding officer, in his endorsement, had some interesting comments on the accident and in particular on the qualifications of the pilot involved. He stated:

"It is quite evident that the pilot made incorrect responses to the LSO's power and waveoff calls. A thorough review of his past performance confirmed my previous opinion that this pilot has consistently demonstrated performance that is well above average. His recent carrier performance and FCLP record were also above average. Following this mishap, he was put in the FCLP pattern and given a thorough and strenuous workout by the squadron LSO/safety officer. Again, his performance was excellent. He is considered to be a highly qualified, combat experienced, carrier aviator. This accident was the result of poorly applied technique and improper response, which could not have been foreseen.

"This accident vividly demonstrates that even the so-called 'best pilots' can never afford to relax, become complacent, or apply anything less than their best efforts. Anything less than full concentration and instant, unerring response during the final seconds of a carrier approach, on each and every pass, is unacceptable. Even though these points have been briefed many times before, they must be continuously hammered home to eliminate even the isolated incidents."

(Crusader, Corsair, Skyhawk, Intruder, Phantom, whatever – this CO's comments may well apply to all. Accepting from yourself anything less than your best efforts – especially during such critical phases of flight – is tantamount to playing Russian roulette. Sooner or later, the odds are gonna' getcha. – Ed.)

notes from your flight surgeon

Marginal

PROPER antiexposure suits should be worn in marginal weather, says a squadron survival officer.

The pilot survivor who occasioned this comment was not wearing an antiexposure suit because the combined air/water temperature during the day had been 120°F or above. He was wearing a summer flight suit with waffle-weave underwear.

During the evening, a weak cold front passed through the local operating area. The squadron survival officer reports that during the survival episode water temperature was 59°F and air, 53°F. The pilot spent 9 minutes in the water before boarding his raft, where he remained for 50 minutes. He was very cold.

After rescue and return to the ship, he was shaking so hard from chills that his temperature could not be taken orally. A 110°F whirlpool bath, with the flight surgeon monitoring constantly, and some hot coffee soon took care of the rescued pilot's problem.

So much for the patient. Now for the flight surgeon's comments on the lack of antiexposure protection.

"The pilot's hypothermia would have been prevented if he had been wearing the required antiexposure suit. It has been this investigator's experience in 2 years as a flight surgeon that aviators would literally rather take the chance of freezing to death than suffer the discomfort of wearing an antiexposure suit.

"It is my strong recommendation that emphasis be shifted from demanding that aviators wear present antiexposure suits to the development of a new form of cold water protection that would be acceptable to those who must wear it."

APPROACH comment: We have to agree with the flight surgeon's statement of risk – a great many pilots would rather take their chances than wear the antiexposure suit. The Navy is now procuring the ventilated wet suit as a replacement for the Mk-5 antiexposure suit.

Perhaps the ultimate solution is the encapsulated liferaft. Although antiexposure suits will still be necessary, this "wraparound" raft will allow the survivor to enter the water without getting wet.

The raft, however, will not take care of off-the-bow ejections, the kind where it's one swing and you're in the water. When the water and air are so cold that you would have to stake your life on the plane guard helo being there when you touch down, then you'd still have to wear some kind of antiexposure suit.

Visible

THE FLIGHT leader circling overhead later told me that my dye marker was visible for about 15 miles.

Pilot after ejection

Know-How

THE VALUE and importance of thorough training of aircrew in ejection techniques and water survival and the *necessity* for this training are underscored in this accident.

The smooth rescue evolution which took place in this survival situation could only have been accomplished because everybody knew what had to be done and how to do it.

Flight surgeon in MOR

Safety Value

IN a helicopter ditching, two of the four crewmen had their helmet visors down, and two did not.

"The former were spared facial injury," says the investigating flight surgeon, "whereas the latter received multiple facial contusions, abrasions, and lacerations.

"These observations again emphasize the safety value of proper use of protective helmet and visor during *all* phases of flight ops."

Foot Save

THE METAL toe of a plane captain's safety shoe saved his foot from serious injury.

The pilot was starting the left engine of an F-4J when the air hose from the starting unit parted and flailed. It struck the plane captain's foot and fractured two small bones.

Investigators found that the safety wire required to connect the two hose lengths was not installed. The application of pressure to the flexible duct assembly while men were working under the aircraft, and the injured man's presence beneath the aircraft were violations of squadron safety procedures.

"The initial blow was absorbed by the metal toe," the report states. "If this man had not been wearing safety shoes, his injury could have been more serious."

Anymouse

This narrative concerns an F-4 bingo from USS BOAT. The things that made it unique were the inaccurate bingo data available and the IFR weather at the primary bingo field. Fortunately, the pilot was experienced and handled the situation in a professional manner, avoiding an embarrassing and costly accident.

Lack of Planning

A SECTION of F-4s was prebriefed to launch from USS BOAT for an airborne CAP/AIC mission. A VFR Case I departure and recovery was briefed and anticipated since the weather was VFR. The flight was routine until information for a Case III IFR recovery was passed to all aircraft because of deteriorating weather conditions. The F-4 bingo fuel was 4400 lbs for NAS Coastline which was 100 miles away – IFR with 500 feet overcast and 3 miles visibility in fog.

The F-4 in question entered marshal with 4900 lbs of fuel 10 minutes before approach time. The pilot advised marshal that he would be below bingo at his EAT. The carrier immediately adjusted to the situation by changing the primary divert field to MCAS Inland which was VFR, 3000 feet broken with 7 miles visibility. The F-4 bingo was lowered to 3500 lbs of fuel for a 170-mile bingo distance. This would have been alright if the information had been valid, but the actual distance was 196 miles to the bingo field, and the aircraft was even 20 miles farther away because marshal was to the east and the bingo field was west.

The approach was commenced with 4000 lbs of fuel, putting him well below the original bingo. Six miles from the carrier with 3600 lbs of fuel, Approach advised him to bingo to MCAS Inland. The ship's weather was 3000 overcast, 1 to 2 miles visibility.

The pilot commenced the standard F-4 bingo profile, climbing to FL400. The aircraft was passing FL350 for FL400 with a fuel state of 2200 lbs when the actual distance to MCAS Inland was found to be 196 miles. As fate would have it, there was a 65-knot headwind at altitude that nobody figured into the bingo fuel requirement.

From this point on, everything else went perfect. The CIC officer on watch was an experienced F-4 pilot and took immediate action. He contacted a squadron representative who advised the pilot to jettison all external stores. The F-4 crew could not obtain a TACAN lock-on on MCAS Inland, but the ADF was good, confirming the carrier's radar vectors. A well done must be given the ship's controller for the precise vectors given at this point.

The pilot commenced an idle descent on distance calls from MCAS Inland Approach Control. He flew a straight-in, idle descent approach, landing with approximately 500 lbs of fuel. He cleared the runway with about 100 lbs of fuel in the No. 1 fuel cell feed tank.

The cause of this close one was wrong divert field bingo information. The distance was inaccurate, and strong winds at altitude were not considered. Aircrews of carrier aircraft must rely on correct information from the ship. Oftentimes there is no other way the aircraft can

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. These reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

REPORT AN INCIDENT, PREVENT AN ACCIDENT

determine fuel for bingo. We had a close one here and were lucky the pilot was experienced enough to fly an exact profile and make the most of good radar vectors.

ASOmouse

Cross-check Those Instruments

AIRCRAFT: A-6A

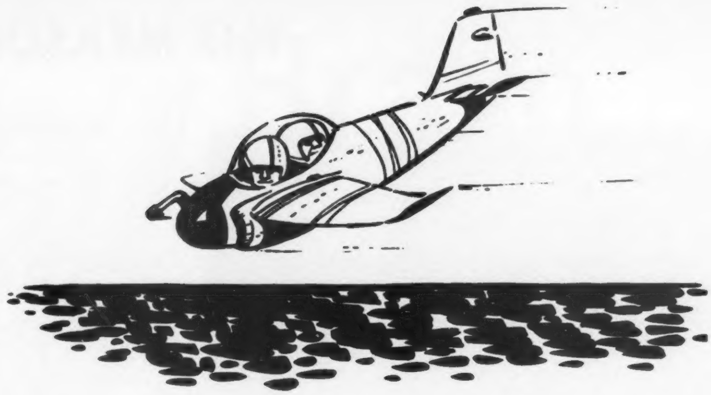
Mission: Day launch from CVA, fly to inland target, make six bombing runs, and return to CVA.

Ship's weather: 1000-foot overcast with 7 miles visibility. (The overcast layer was approximately 1000-foot thick with scattered clouds about 15,000 feet and haze in between.)

We held at marshal for about 30 minutes at 17,000 feet. During this time, the ship updated the weather and altimeter settings about every 5 minutes. Altimeter was steady at 29.99.

On the penetration, we broke out of the overcast at 2000 feet, which should have been our first indication that the altimeter was wrong. Passing through about 1700 feet, I noticed that the radar altimeter was indicating 700 feet. I immediately leveled off at about 600 feet.

I brought the altimeter differences to the attention of my BN, and we tried to visually gauge our altitude (very difficult above water). We dropped to 500 feet on the radar altimeter, where the LAWS tone was set to go off, and found that the tone didn't work.



The CCA was completed using the radar altimeter and the pressure altimeter set to correspond with it – a difference of 1.00 inches in the Kollsman window.

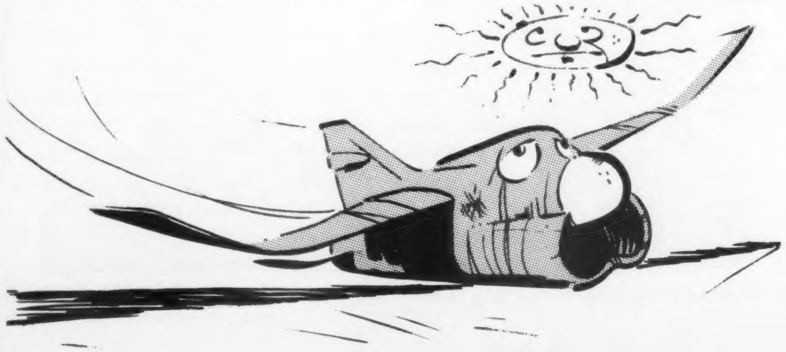
This situation was scary enough in the daytime. At night it could have been much worse. (Note: The pitot heat was turned on prior to the penetration.)

Maintenance determined that the error was inside the pressure altimeter. Cross-checking instruments cannot be overemphasized. This should be done by both crewmembers.

Anymouse

A Moment of Inattention

THE SKIPPER of an A-7E squadron, after a bombing hop, split his four plane flight for individual ACLs at Homebase. The first approach was the type that builds confidence in the aircraft's ACL capabilities. When steady downwind at 1500 feet in the ACL box pattern, the Skipper engaged altitude and heading hold so he would have both hands free to operate the radar. Earlier in the flight, the radar had proven to be one of exceptional quality, capable of painting the landing airfield in great detail.



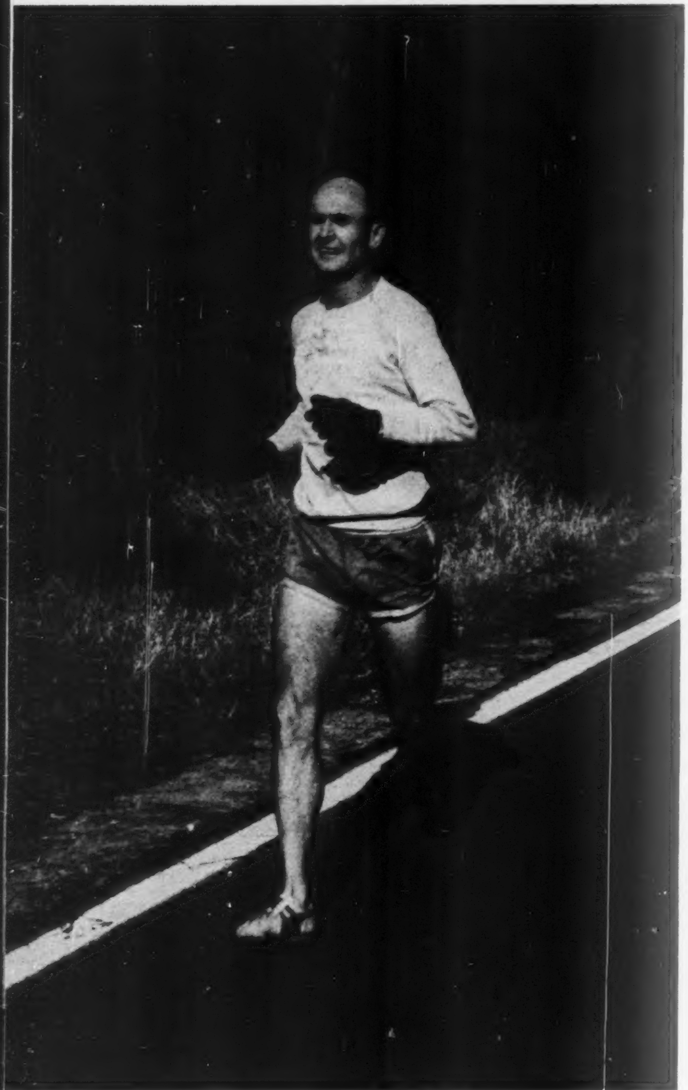
While working with the radar, the Skipper noticed the angle-of-attack at 23 units with the aircraft descending through 1000 feet (700 feet AGL). A recovery was initiated immediately. Although the aircraft is equipped with a rudder shaker to warn of impending stall, it failed to function as the aircraft decelerated through 20.5 units angle-of-attack. As the aircraft slowed further, the altitude hold mode disengaged allowing a gradual descent. An instrument scan breakdown occurred because of the Skipper's concentration on the radar.

Thirty seconds more and the AAB would be searching through the wreckage to find what aircraft failure had caused the accident. It would never enter anyone's mind that an aviator of this experience level could fly into the ground on a bright sunny day with all systems functioning normally.

ASO Mouse

This shows it can happen to the high rent guys, too. All it takes is a momentary goof.

THE MEASURE OF SUCCESS



By LtCol C. S. Tubbs
Commanding Officer
HMM-264

HOW does one measure the ability and success of a naval aviator? Success in aviation is similar to success anywhere, and to be successful, one must be guided by certain basic principles. In search of these principles, one can turn to George Allen, head coach of the Washington Redskins. In an article written by Allen and published in the July 1973 issue of *Sports Illustrated,* he expressed his winning philosophy:

"Mental preparation never ends." Mental preparation is perhaps the most difficult and time consuming task of the aviator. Ground school is not enough. The aviator needs to spend hours each week learning and relearning his aircraft. There are a thousand details to be learned – important details that can save lives. Emergency procedures must be learned cold, and when coupled with good judgment, they enable aviators to handle the unexpected. Before flying, the pilot must think of flying and clear from his mind other tasks and problems.

"Never take anything for granted." The best place to practice this principle is in the preflight brief. Attention to detail is important, and all aspects of the mission should be thoroughly covered. Do not take for granted that the good weather will remain good. Thoroughness is extremely important and must be practiced in all phases of flight.

"If you are not in shape, the problems will lick you." It is important as Marine *(and Navy – Ed.)* officers and aviators to be physically fit. One might run 3 miles in 15 minutes, but still be unfit to fly. A common sense attitude toward drinking and adequate rest is needed.

"Experience itself isn't worth a cent unless it's the right type of experience." Throughout the normal flying day, naval aviators are subjected to a variety of tasks. There may, however, be certain required skills that are overlooked for long periods of time. The pilot needs to know his limitations and subsequently direct his attention to overcoming areas of weakness. He should strive to go well beyond the minimum standards set by NATOPS.

In the end, naval aviators are subjected to a Super Bowl to determine the best. Coach Allen also stated, "When you lose, you die a little." Every flight is a life and death matter and should be prepared for in a manner to remove all question as to its outcome. Mental preparation, thorough planning, physical fitness, experience, and above all, attitude are the measures of a competent aviator. The safe aviator is both a successful and professional aviator.

MAG-26 *Safety Raiser*

Bravo Zulu

THE CREW of an SH-3D launched on a 4-hour ASW mission from KITTYHAWK. Before the flight ended, the two crewmen, Petty Officer Tolzin and Airman Burchette, would play vital roles in sustaining the life of one of the pilots.

Upon return to the ship, the helo was directed to "delta" starboard and await landing.

While in the starboard plane-guard pattern, a loud pop was heard by the crewmen. The copilot's LR-1 liferaft had inflated. The copilot was trapped between the inflating raft and his seatbelt/shoulder harness. The pressure was too great for him to release the latch, and he lost consciousness almost immediately. Quickly, Petty Officer Tolzin came forward to investigate. He tried to release the copilot's harness, but was unsuccessful. Airman Burchette handed him his unsheathed survival knife, and Tolzin punctured the raft.

AW3 Ronald Dean Tolzin and AWAN David Dean Burchette, HS-4

Immediately thereafter, Tolzin realized the copilot wasn't breathing, and because the victim's jaws were clamped tightly shut, began to administer mouth-to-nose resuscitation. The copilot recovered consciousness, but struck the flight controls forcibly during uncontrollable convulsions.

Airman Burchette restrained the flailing copilot while Petty Officer Tolzin continued resuscitation. The HAC was able to maintain control of the helicopter and landed safely aboard KITTYHAWK.

Later, the copilot was given a thorough physical examination and, thanks to the prompt action by his crewmen, suffered no physical or neurological damage.

Swift, competent action by Petty Officer Tolzin and Airman Burchette, both professionals in every sense, prevented the copilot from suffering permanent brain damage or death, and possible loss of the aircraft and its crew.

WELL DONE.

Letters

"We cannot afford to forget any experience, not even the most painful."

Dag Hammerskjold

ICAO Instrument Exam

FPO, San Francisco – The December 1973 edition of APPROACH contained a letter to the editor entitled "Know Your Procedures." This squadron would like to obtain a copy of the ICAO instrument exam mentioned therein, but the address for LTJG D. K. Miskill, Jr., was incomplete.

Could you please let this squadron know his full address?

G. B. Rohles
VP-48

• The initial correspondence came to us via Anymouse, and the address was incomplete. LTJG Miskill, please take the above FORAC. PATRON 48's ZIP is 96601.

"Spin It" Fallout

NATC Patuxent River, MD – Bravo Zulu to LCDR Pottratz for his article "Spin It" in the October issue. I would like to elaborate on his reference to "until airplanes are made spin-proof." Since the Navy presently has airplanes that do spin and depart, why not alter them to make them as spin-and-departure-resistant as possible in addition to training in this area? This can be done by 1) external aerodynamic modifications or 2) by modifying existing flight control systems (on a not-to-decrease-the-operating-envelope basis).

Costs and time supposedly preclude the first method. A device employing the second method is currently being evaluated in the F-14. In addition, a civilian contractor (under Air Force contract) has developed and ground tested an antideparture device which could be applied to the A-7 and F-4. The Navy was aware of this device as early as January 1973, yet in spite of the known validity of the concept, no actual flight test or evaluation is planned. Theoretically, if the device proved successful, the cost of an entire test and retrofit program would be paid for, if it saved a single airplane.

In addition to the safety aspect, the current lack of high angle-of-attack training and of programs to improve the high angle-of-attack flying qualities essentially denies the use of the complete potential operating envelopes of some of our current fleet airplanes. In my opinion, this degrades our operational effectiveness.

Although my feelings on this subject are somewhat emotional, I think some future possibilities in naval aviation are just as alarming. Some individuals would train only in simulators, since no actual flying means no accidents. Others would replace pilots with remotely piloted vehicles containing very costly complex weapons systems. Probably not everyone in the naval establishment thinks of these possibilities as totally absurd. I certainly hope more will think like LCDR Pottratz.

LT W. W. Honour

• The device alluded to is an electronic unit that has been ground tested *only* on a computer by the CalSpan Corporation. The device requires additional refinement before testing in a wind tunnel and in flight.

The primary feature of the device is to eliminate sideslip at high angles of attack. Sideslip elimination will inhibit departures. If it will work practically as well as it supposedly will theoretically, it will be a welcome item for installation. If the device is as good as advertised, let the contractor prove its worth and then present it for incorporation. Let's use the "fly before buy" technique.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Hypoxia

NAS Lemoore – In response to the APPROACH editorial comments to Hypoxicmouse ("Hypoxia in an H-3," December '73 issue, page 26), I do not feel that a direct reply was given.

First off, the problem of altitude limitations imposed by lack of oxygen aboard the aircraft is not peculiar to H-3s, but rather is common to the usual helo driver. Few helos carry oxygen as we of SAR Lemoore do because of our unique high altitude SAR capability within the mountainous areas of Yosemite, Sequoia, and Kings Canyon.

The General NATOPS (3710.7G, Section 704 (a)) passage which you quoted would apply only to the pilot at the controls. The gent to whom you responded was not the pilot at the controls, obviously. Therefore, I feel that your response to this Anymouse was lacking somewhat.

Hypoxicmouse suggested that the H-3 (I believe any helo) should be equipped with two oxygen bottles. According to General NATOPS, only the pilot at the controls in this situation must be on oxygen. It would be interesting to know if the HAC of this H-3 either filed for or accepted the

FLIP Changes

THE DEFENSE Mapping Agency, St. Louis, Missouri, has notified the Naval Safety Center of the following change and reminder:

• *Alaska Positive Control Area.* The Alaska Positive Control Area is scheduled to become effective at 0901 GMT on 28 February 1974. It will include all of Alaska from FL240 to FL600 inclusive, except that the Alaskan Peninsula west of longtitude 160° 00′ 00″ W is excluded. For details, consult Pilot Procedures, Section II, Planning, North and South America.

• *Daylight Savings Time.* The emergency application of daylight savings time as an energy conservation measure is now in effect. Some state legislatures, however, were not in session at the appropriate time for filing exceptions on a timely basis. Thus, when flight planning, it is essential that pilots check the local times at destinations in Alaska, Florida, Idaho, Indiana, Kansas, Kentucky, Nebraska, North Dakota, Oregon, South Dakota, Tennessee, and Texas.

altitude of 10,000′ MSL with full knowledge of his oxygen limitations. From what I read in the Anymouse, I feel that a reminder was in order for helo drivers to review oxygen limitations prior to filing for or accepting 10,000′ MSL or higher.

Nevertheless, this Anymouse interests me in that, although only the pilot at the controls is required by NATOPS to be on oxygen under these circumstances, I would prefer that my copilot also be on oxygen, in his seat, alert, and capable of assisting me at all times during a cross-country flight (especially in an IFR environment).

Another item of interest to me is that if the pilot at the controls was complying with the NATOPS requirement to be on oxygen, why was Chester Coughly smoking?

LCDR Norman K. Hicks

Safety Shoes for Waves

NAS North Island – As an aviation safety officer, I have a growing concern over the safety and welfare of the women who work around our aircraft every day. They are very talented and intelligent, and their motivation to succeed at the tasks assigned to plane captains and maintenance personnel sets a high standard for all. This is particularly noteworthy because they have to work under less than optimum conditions with inadequate footwear.

At this time, squadron policy simply forbids anyone to work around machinery or aircraft without appropriate headgear, eye protection, clothing, and footwear. To meet this requirement, women must either accept and wear oversized, ill fitting men's hard-toe working boots or the equally unsafe leather soled, semi-high-heel, steel-toe shoes which appear to be the only safety shoe available to women on the commercial market in San Diego.

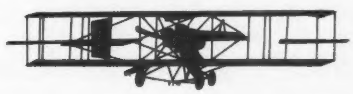
In a few words, present supplies of hard shoes for women are inadequate and unsafe. I feel the very highest priority should be put on contracting for and producing adequate protective footwear for the ever-increasing numbers of women in the aviation Navy. Several attempts have been made to find shoes both within the Navy supply system and in open purchase, but without success. (A UR is also forthcoming.)

HELSUPPRON ASO

• We've done some checking around for you. The word from the Defense Personal Support Center is that there is no woman's safety shoe in the Defense Supply System at present. The Navy does not have a safety shoe for military women, nor do the other services.

You must buy the shoes outside the military supply system. Industrial activities which employ a large number of women who work in foot-hazardous areas often have "shoe stores." Or, you could buy through the catalog of any one of a number of firms which manufacture safety shoes.

Anyone desiring the addresses of possible sources of safety shoes, send your cards and letters in to APPROACH, and we'll send you a copy of our list.



Vol. 19 **approach** No. 9

RADM W. S. Nelson
Commander, Naval Safety Center
Publisher

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

Contents

Departments

NavAir 00-75-510

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Credits

Breaking a tradition of many years, APPROACH uses a photo for this month's cover. LCDR Ronn Maratea's photo gives a pilot's-eye view of a "night carrier approach" from an F-4 cockpit. Photos on page 15 and back cover also by LCDR Maratea.

U.S. NAVAL SAFETY CENTER

☆ U.S. GOVERNMENT PRINTING OFFICE: 1974–739-134/13

The following information was received by message from a VP squadron. It could have been sent by any shore-based squadron anywhere – with just a slight change or two in type or location.

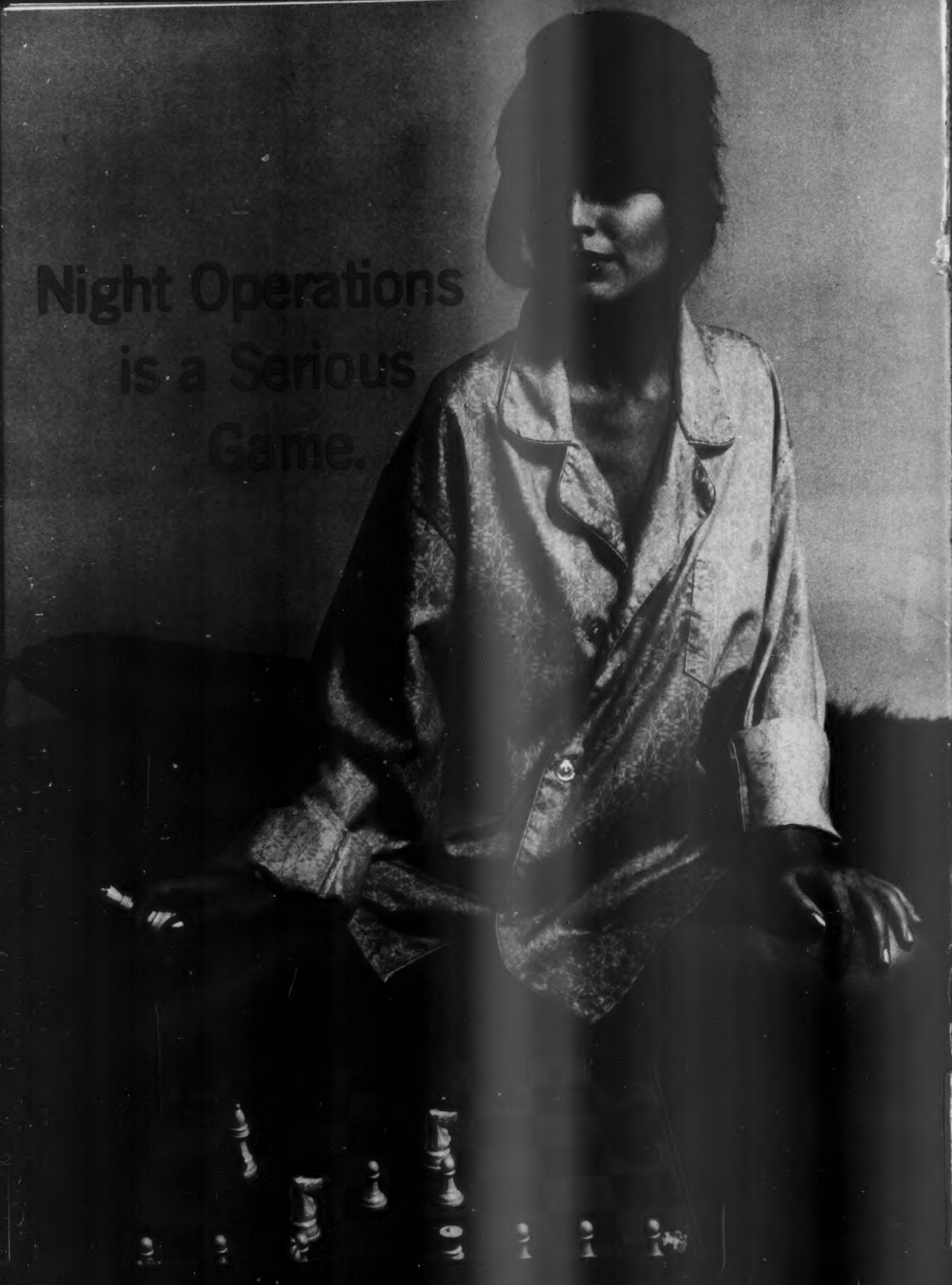
LOOK OUT TO LIVE

THE AIRCRAFT (P-3) was holding northwest on the 293 radial of Salinas VORTAC – 4000 feet, left turns – on an IFR flight plan, just before being cleared for a VOR RWY 13 approach. Upon completing a turn inbound, a light, orange and white civilian aircraft was seen at 12 o'clock level. Evasive action was taken by pulling up and turning right. The light plane was not observed to make any evasive maneuver.

Approach control was queried about the presence and identity of the light aircraft. They had observed no such target. Both aircraft were above an undercast (tops 1800 feet) in the clear, with good visibility.

The squadron that sent the message also reported two other near midair collisions within 60 days. With the coming summer months bringing consistent VFR weather, but with reduced visibility in haze, there will be a significant increase in light aircraft operations. The only solution to avoid the possibility of a midair is constant vigilance. *ALL FLIGHT CREWS MUST BE BRIEFED ON THE IMPORTANCE OF OUTSIDE OBSERVATION WHILE OPERATING IN A HIGH–DENSITY TRAFFIC AREA.*

The importance of keeping all windows manned has been reemphasized. Further, an additional observer will be brought to the cockpit under certain conditions until the aircraft is clear of high-density traffic areas or until the aircraft is ready to land.


Night Operations
is a Serious
Game.